

INTELLECTUAL PROPERTY PROTECTION  
IN A PROGRAMMABLE LOGIC DEVICE

David B. Parlour

Richard S. Ballantyne

ABSTRACT OF THE DISCLOSURE

~~Individual IP vendors can directly license their IP modules to PLD users under their own chosen conditions. Individual IP vendors can use time-based licenses or use-based licenses. Each PLD is manufactured with a non-volatile non-rewritable unique device identifier (UDI) that uniquely identifies the PLD. If, for example, a user obtains a license to use a particular IP module on a particular PLD, then the IP vendor issues the user an authorization code that contains the UDI (in encrypted form) of the authorized target PLD. When the user wishes to use the IP module, the user supplies the authorization code to a license manager. The license manager decrypts the authorization code and checks that the UDI of the supplied authorization code matches the UDI of the to-be-programmed target PLD. If the two match, then the license manager encrypts a key for the IP module using the UDI and a private key, and then sends the encrypted key to the target PLD. The target PLD uses its UDI and the private key to decrypt the key. The key is then stored on the PLD. When the configuration bitstream for the design that incorporates the IP module is later sent to the PLD, the license manager encrypts the IP module portion with the key. The PLD receives the bitstream and uses the stored key to decrypt the IP module portion of the bitstream. The unencrypted bitstream is then used to configure the PLD.~~